Air Force STTR **Impact**

Advanced Capacitor Sustains Energy and Power Density

Company:
Evans Capacitor Company

Location:
East Providence, RI

Employees:
8

President:
David Evans

Project Officer:
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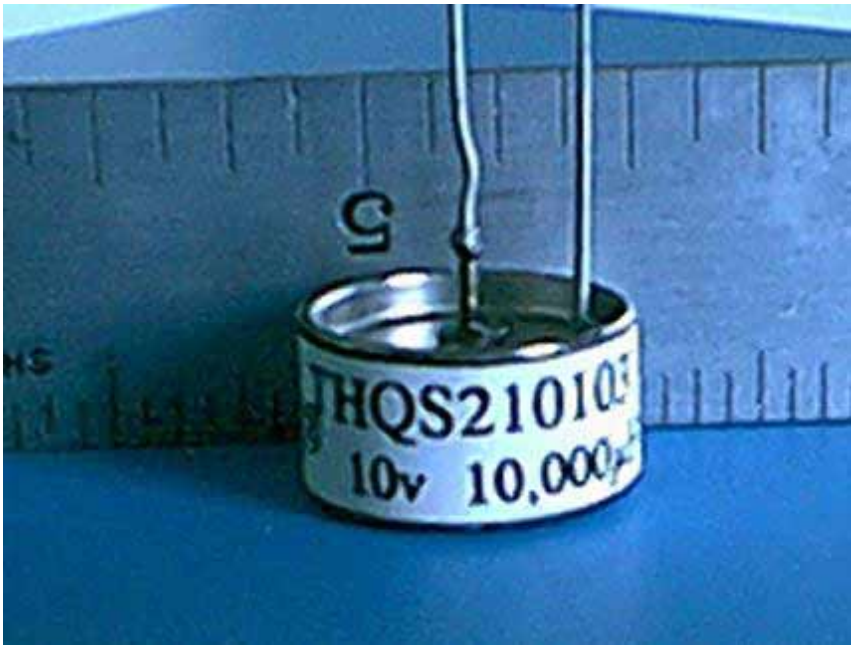
STTR Partners:
Florida State University and Florida A&M University



Air Force Requirements:

The Air Force requires high-energy-density power sources for weapons applications. The units must operate during very high levels of mechanical shock and vibration, work over a wide temperature range, and have a long life.

STTR Technology:

Evans Capacitor was awarded STTR Phase I and Phase II contracts to develop the power source based on its Hybrid® capacitor technology. The Hybrid capacitor combines the positive electrode of a tantalum electrolytic capacitor with the negative electrode of a ruthenium oxide supercapacitor to achieve a ten-to-one improvement in energy and power density. At the time of the Phase I award, the capacitor could not withstand the anticipated levels of mechanical shock and vibration. A new physical design for the capacitor was developed to meet the mechanical requirements. Changes to the internal construction included the incorporation of shock-absorbing materials, the substitution of an individual reduced mass, thicker tantalum electrode for the existing multiple electrode stack, and the elimination of two ruthenium oxide electrodes. Internal wiring was changed to allow relative movement of the electrodes within the case during shock loading.

For more information on this story, contact Air Force TechConnect at 1-800-203-6451 or at www.afrl.af.mil/techconn/index.htm

These changes required the capacitance density of the ruthenium-oxide electrode to be increased to a level beyond the existing state-of-the-art. Working in conjunction with engineers at Florida State University, we successfully adapted hydrated amorphous ruthenium oxide to the new design. These new electrodes have five times the capacitance density of the prior crystalline ruthenium oxide electrodes.

Company Impact:

Evans Capacitor has developed these capacitors into three distinct product families: the THQS2, THQA2, and THQS15. These have been sold to the Air Force for their continued weapons system development and testing. Evans has also supplied units to Sandia National Labs for use in the development of ground-penetrator weapons. A non-shock-hardened spin-off unit, taking advantage of the lower mass and higher energy density, the THQA2 has been sold in an avionics application. There is a high level of interest in these capacitors as evidenced by the large number of sample requests by both military and non-military customers.

Company Quote:

"An objective of Evans Capacitor Company is to provide its customers state-of-the-art high-energy-density capacitors. The commitment of the Air Force, both in the STTR award and as a customer for the capacitors has made it possible for us to continue to support and develop this technology."

David Evans
President
Evans Capacitor Company

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